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THE OHIO STATE UNIVERSITY NCTR DATA BASE FILE STRUCTURE 1/1

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J S CHEN ET AL. OCT 82 ESL-714198-1 N00014-82-K-0037

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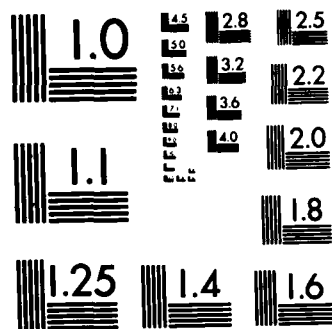
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The Ohio State University

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THE OHIO STATE UNIVERSITY NCTR  
DATA BASE FILE STRUCTURE

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**ElectroScience Laboratory**

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Technical Report 714190-1  
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16. Abstract (Limit: 200 words) The ElectroScience Laboratory of the Ohio State University is developing an advanced radar target backscatter measurement facility. The data from this facility is stored in a standard format on computer compatible media (such as floppy disks). This report gives the details of the data file format which is used.				
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## I. INTRODUCTION

The ElectroScience Laboratory of The Ohio State University is developing an advanced radar backscatter measurement facility. This facility is being developed so that Non-Cooperative Target Recognition (NCTR) techniques can be developed by a data base user community. The NCTR data base contains files in a standardized format. The format allows for a named file to contain header information in plain English text (ASCII) followed by a variable amount of amplitude (dB) and phase (degrees) data. Any file may contain raw measured data, calibrated data, or filtered/edited calibrated data. The format uses a fixed word length (16 bit) packed in 512-word blocks. The result is flexible yet efficient storage of data.

## II. DETAILED FORMAT

An NCTR data file contains a file header and a set of data points (see Table 1). There are three lines of English language text in the file header, each containing 60 ASCII characters. The number of data points may vary up to a maximum of 801. Numerical information on the number of data points, the frequency of the first data point, and the frequency increment can be retrieved directly from the 3rd line of the file header, as shown in Table 2. The data files are originally created on Digital Equipment Corporation (DEC) PDP 11/23 floppy disks in RT11 format. They are then transferred to disks on a DEC VAX system.

Files on the VAX disks are formatted in blocks of 512 8 bit bytes as shown in Table 3. Block 1 contains both characters and real numbers. Characters are stored in every other 8 bit byte from byte 1 to byte 360. (This permits data transfer of 16 bit words.) From byte 361 to byte 476 are 4-byte real numbers stored in groups of four consecutive bytes in the standard "exponent, mantissa, mantissa, mantissa" format. Bytes 477 to 512 are not used. From block 2 on, only 4 byte real numbers are stored and there are unused bytes from byte 409 to 512. In Appendix 1 there is a Hexadecimal/ASCII dump of a typical VAX disk file called C5203. In reading four consecutive bytes for a real number, the first byte read should be placed in the first byte of a REAL \*4 FORTRAN variable, the 2nd byte in the 2nd byte and so forth. There is no need to swap bytes on a VAX computer. A flow chart for reading the file is shown in Figure 1. Appendix 2 is the header and data printout of the same file (C5203). In Appendix 3 there is a listing of a FORTRAN program which can read files from VAX disks and plot the data. A plot of file C5203 is also included in Appendix 3.

TABLE 1

## DATA FILE OUTLINE

FILE HEADER	LINE 1 (60 characters)
	LINE 2 (60 characters)
	LINE 3 (60 characters)
DATA POINT 1	Amplitude in dB, phase in degrees
DATA POINT 2	Amplitude in dB, phase in degrees
	.
	.
	.
	.
	.
	.
DATA POINT 801	

TABLE 2  
LINE 3 OF THE FILE HEADER

CHARACTER NO:	1	4	5	6	11	15	20	24	60
		# OF			STARTING FREQ.		FREQ. INCREMENT		
VALUE:		DATA PTS			IN MHz		IN MHz		.....

NOTE: The starting frequency is the frequency of the first data point.

Frequency of the  $n^{th}$  data = starting frequency

+ (n-1) x Frequency Increment.

TABLE 3  
DETAILED BLOCK AND BYTE ASSIGNMENT FOR  
THE DATA FILES

NOTE: Line 1  $\equiv$  1st character ~ 60th character  
 Line 2  $\equiv$  61st character ~ 120th character  
 Line 3  $\equiv$  121st character ~ 180th character

BLOCK 1	BYTE #	(8 BIT BYTES)
	1	1st Character
	2	NOT USED
	3	2nd Character
	4	NOT USED
		.
		.
		.
		.
		.
	2n-1	nth Character
		.
		.
		.
	359	180th Character
	360	NOT USED
	361	Amplitude of 1st
	362	Data Point
	363	(Four-Byte Real
	364	Number)
	365	Phase of 1st
	366	data point
	367	(Four-Byte Real
	368	Number)
		.
		.
		.

TABLE 3 (Cont.)

BLOCK 1 (Cont.)

	Amplitude of 29th Data Point
	Phase of 29th data point
476	
477	unused bytes
512	

TABLE 3 (Cont.d)

BLOCKS 2, 3, 4, . . .

1	Amplitude (4 byte real) of 30th data point
2	
3	
4	
5	phase of 30th data point
6	
7	
8	
9	.
408	unused bytes
409	
512	

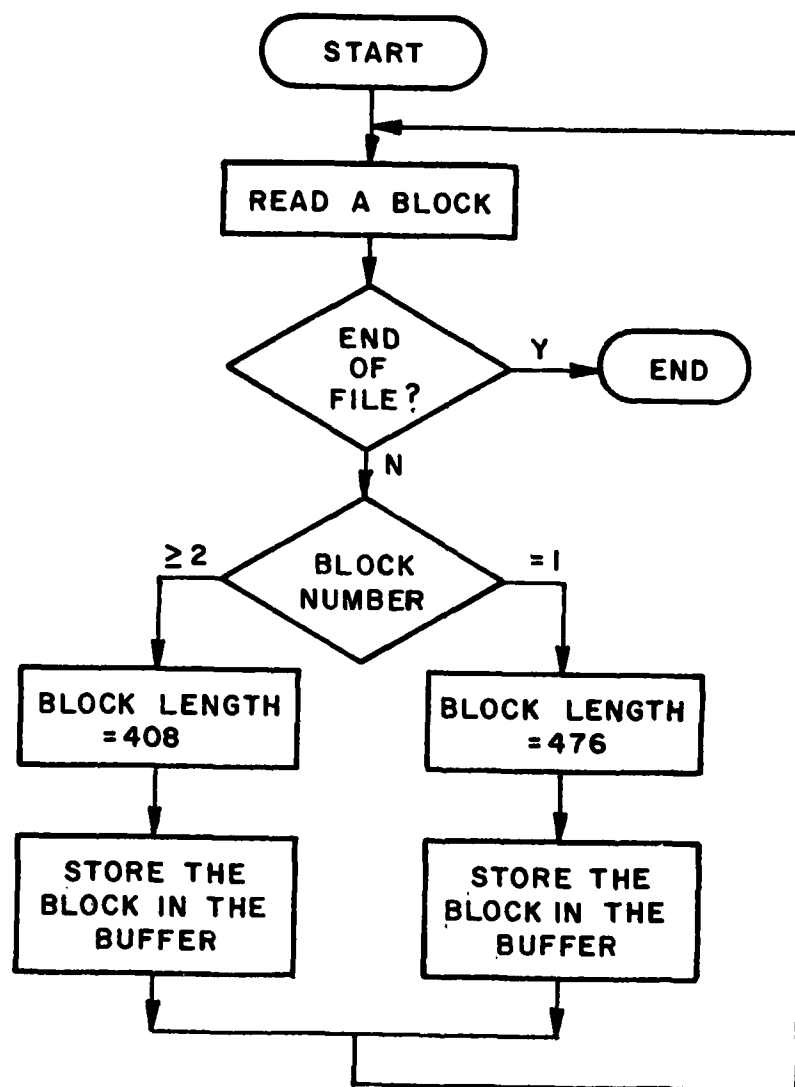


Figure 1. Flowchart for reading files.



## APPENDIX I

### HEXADECIMAL/ASCII DUMP OF VAX FILE C5203

This printout was produced by the VAX utility called "DUMP". It is printed in the standard output format. Hexadecimal data is printed from right to left in this dump while ASCII equivalent values are printed from left to right. Thus, Hex "43" corresponds to ASCII "C" and Hex "10" corresponds to an ASCII "non printing" character (shown as "." and not used by the file system).

NOTE: As mentioned in the text, ASCII characters are packed 1 per 16 bit word. This printout, however, produces an ASCII character from each 8 bit byte (if legal ASCII, otherwise a "." is inserted in the ASCII character string). Thus to read the header data from the ASCII string in this dump, only every other character is used.



Dump of file DRA1:CHENJCS2B3.11 on 3B-SEP-1982 18:53:58.37  
 File ID (14693.28.8) End of file block 5 / Allocated 6

Virtual block number 2 (00000002), 512 (0200) bytes

```

EEF84298 29A3C315 34D54298 C976C315 8DF8429A E174C308 3FF8429F 5168C321 1.KQ.B.7..t..B.....v...B.4.....B... 000000
89214292 2926C296 39934291 E6DFC284 3E4E4296 837CC2D0 36AE4296 89C1C2E5 .....B.6..l..BN>.....B.9..&).B1. 000020
8E174293 C3AFC23F 98424292 688BC26E 5D85429C 3C18C268 D6F54291 261AC287 ...&.B.k.k.<.B.ln...88.7....B.. 000040
1DCB4296 E88D4125 9C214298 C7A1C183 24994294 8BD7C109 E2524293 F23DC148 H...BR.....B.$.....B1.XA...B.. 000060
87784298 8168425B 9E774296 9CF84209 508D4295 CA0D4228 50D8429A 3D854201 .B.=.B.P+B...B.P.B...Bw.(B'.Bp. 000080
B0EB42A8 9C5B42D8 FD7A429E 82854299 E86A429A DC92428C 496842A2 16CF4239 .B...Bh1.B...Bj...B...Bz...B[...B.. 000100
2ECE42A8 A5D442FA B12A42A8 AAC342E1 8CCE42A1 7DA7429F C0F142A2 906A42B7 .Bj..B...B..j..B...B...B*..B...B.. 000120
EFC142A5 DDA842EA 5FCB42AB 8F3942F7 78D442AB 186842E3 913F42A7 BD9042DF .B...B7..B'..B.x.B...B...B...B... 000140
347F42B8 41D3431C 176D42AB CAC942FD A2BE42AB 36AE431F 245D42AE 367D430C .Cj6.Bj$.C.6..B...B...Bm..C.A.B.4 000160
620142AF 30854320 F5B242AF D4324326 60DC42AF 90D14323 B45642AF 1E6E431F .Cn..BV.#C...B.'&C...B..C...B.b 000180
305A42AE 3E4C4324 59624283 9AB7433F 38D94288 56804337 80B24283 A9064328 (C...B..7C.V.B.'7C...8bYsCL..BZ. 000200
C8A342B1 37ED4348 849042B2 5A4F4332 93A142B4 DEDD4337 2ADA4287 85CC4335 5C...B..37C...B..2COZ.B..HC.7.B.. 000220
017C0184 318C0194 011C0124 013C0134 013C0144 014C0154 015C0164 016C0174 7C044353 SC..l..Bo.JC62.BfJJCt2.B.d.....l. 000240
007C0284 758C0294 009C0304 00AC0314 00BC0324 00CC0334 00DC0344 00EC0354 t..l.d.\.T.L.D.<.4...$..... 000260
00333004 300C0014 001C0024 002C0034 003C0044 004C0054 005C0064 006C0074 t..l.d.\.T.L.D.<.4...$.....3. 000280

```

Dump of file DRA1:CHENJCS203.11 on 30-SEP-1982 10:53:08.37  
File ID (14693,28,0) End of file block 5 / Allocated 6

Virtual block number 3 (00000003), 512 (0200) bytes

```

E0304289 422D4358 37154288 1206436A 3C0D42B4 6EC64358 54894287 2DFA435E ^C.-.B.TXC.n.B.<JC...B.7XC-B.BE. 00000000
45F74283 332F435F 3848428A 71A14380 27D2428B 78E54368 CAD14286 F7184354 TC...B..HC.C.B..C.q.8K...C/3.B. 00000200
DF4428A 32874352 13124288 A92F4370 26C4428B 99144367 A2EE4286 D408435A ZC...B..gC...B.&PC/.B...C...ED. 00000400
64FC4286 289A4377 C91A4265 50804370 48954287 2C844367 86224281 C009437D 3C...B".gC...B.HpC.P.B..WC.(.B.d 00000600
0AB24285 34FC437A 774C4284 A4004380 51AC4285 A17E438A 8EBA4282 574D4384 CMV.B...C~...B.Q.C...BLwzC...B.. 00000800
488C42AF 39424388 A00A42AA F49A4388 454842AE 00CE438E 18024282 B37B437D JCC.B...C...BKE.C...B...CB..B.N 00000A00
ECAC429F 20224398 C2AE42A7 29D84396 9E8B42AC DD5F4387 8EC942A9 9CC84387 C...B...C...B...C).B...C".B.. 00000C00
CCF5429E 5459439D B35542A3 33984388 E08042A3 F3584380 085D4298 FE984380 C.U.BJ...CX..B...C.3.B...C.n.B.. 00000E00
D89D429F 5E8D4393 199342A2 427C43C1 BF074296 9724438E 80534298 55A743A8 C...B...CS..B...CIB.B...CP...6Vn 00001000
6E874295 EC5343C6 871D429E EC574295 B68C43E3 2F754296 389243CB 63084294 517643C5 CVO.B..c.C.B.Bv/C...BM..Cj..B.. 00001200
IDA74231 C36A437C EC574295 B68C43E3 2F754296 389243CB 63084294 517643C5 CVO.B..c.C.B.Bv/C...BM..Cj..B.. 00001400
2AC54293 EC3D437E 09324295 F80F43F7 4A234298 2F4943F0 DE534292 7D6C43D9 C1).BS..CI/.B(J.C...B2..C=..B.. 00001600
017C0184 018C0194 3C3342A0 3B1A4400 59734296 012543F4 7AE5429A 88B443FA C...B.z.CX..By.C...B3K... 00001800
00FC0104 010C0124 012C0134 013C0144 014C0154 015C0164 016C0174 t.l.d.\.T.L.D.<.4...S..... 00001A00
007C0084 006C0094 009C00A4 00AC00B4 00BC00C4 00CC00D4 00EC00E4 ..... 00001C00
00330004 002C0014 001C0024 000C0034 00000034 00000044 00000054 t.l.d.\.T.L.D.<.4...S..... 00001E00
```

Dump of file DRA1:ICHENJCS283.1 on 30-SEP-1982 10:53:08.37  
File ID (14693.28.0) End of file block 5 / Allocated 6

Virtual block number 4 (00000004), 512 (0200) bytes

```
88EC4295 AF3E4407 59834294 CC5643FF 86374299 614D4402 780F42A7 AC94407 .D...B.C.DMa.B7..CV..B.Y.D>...B... 000000
C8FF42A5 2D24415 701D42A1 FEF440F 683542A4 417D4412 38F742A6 882D440F .D...B.i.DJA.B5K.D...B.J.D...B... 000020
C33442A2 328E4415 75884280 C5084416 131E42A8 58914413 A67842A1 8A0E4412 .D...Bx..D.X.B...D...B.u.D...B4. 000040
215442A6 1B84418 CCAB42AC A255441F AB1142AC A88B4418 CEC7429D A28A4417 .D...B...D.E.B...DU..B...D...BTI 000060
582D42AD 20D6441D E11B4282 D51B4426 9E1142B0 45C54429 1B9942A4 C00C441D .D...B...D.E.B...AD..B...D...B-X 000080
3D7C42AC 71F54422 26C642B0 5D1C4430 95DF42B3 53144426 20CC42A8 5DAD441D .D.J.B..&D.S.B..0D.J.S.&"D.q.BI= 0000A0
9A7242B0 350A442D 128A42AD 0F464428 F87C42B4 0CD84429 D93B42B3 FA984424 $D...B1..Dg..B0..D...B..D..B. 0000C0
DB1F42AF 59EB442F 735F42B3 0D3A442C CD4042AF BA674427 A16942B2 DCB1442C .D...B1..Dg..B0..D...B..D..B. 0000E0
FC724234 53F54431 96C64280 8B014433 1A8F42B4 6840C433 3EA042A8 C7854430 .D...B>3.0h.B.3D...B..D.c.Br. 000100
8C8742B4 3B51C431 374942A8 96B8C432 9E2C42B1 79DB430 C94B42B5 B91DC42F /...BK.0..y.B..2...B171.Q..B... 000120
F1F442B2 017EC429 D5144283 7CD0C42A 52A942B3 7B11C42E BA1042B3 088EC42D -...B...C.B.R*.I.B..).~.B... 000140
ED8742AA 50E0C42E 3D1C42B5 5D55C427 EBD542B8 9A49C428 24CE42AF 5902C430 0..Y.B.$+.I...UJ.B.=...P.B... 000160
017C0184 018C0194 AB564282 2350C427 D77B42B4 9ABEC423 F65642AF A9CDC426 &...BV.#...BC..P#.BV.....1. 000180
50FC0104 010C0114 011C0124 012C0134 013C0144 014C0154 015C0164 016C0174 t..l.d.\.T.L.D.<.4...$. 0001A0
007C00F94 008C0094 009C00A4 00AC00B4 00BC00C4 00CC00D4 00DC00E4 00EC00F4 .....1. 0001C0
00330004 000C0014 001C0024 002C0034 003C0044 004C0054 005C0064 006C0074 t..l.d.\.T.L.D.<.4...$. 0001E0
```

Dump of file DRA1:ICHENJ5203.1 on 30-SEP-1982 10:53:08.37  
 File ID (14693.28.0) End of file block 5 / Allocated 6

Virtual block number 5 (00000005), 512 (0200) bytes

```

386742AE 7175C421 3A9442A8 09A8C420 134842AC CC4DC41E 1B3A42B0 490FC426 &...I.B:...M..BK. ....B.:l.vq.Bg8 000000
E30942A5 5233C415 435142AC A715C41B 540142AD 6E89C421 EA6C42AE C049C421 l.I..B1.l..n.B.T....BOK..3..R.. 000020
4A0242A5 3035C414 310F42AF 7095C413 859842AB 3278C419 891442A4 4464C41E ..dD.B....[2.B....P.B.1..5..8.J 000040
9C3542AE 35D0C42D 783D42A5 3A18C413 7D7542A5 DC11C410 5CB142A8 F437C410 .7..B.\.....Bu)....B=[....85. 000060
BE7942A8 3341C437 7E9042A3 FC5DC407 E5C142A0 8BF1C40C E1AD42A5 9EE8C409 ....B.....B....J...B..~..A3.B.y. 000080
47A042A4 35D8C400 034642A0 991DC401 85C842A4 DB8FC400 AD5342A8 91F3C405 ....B.....B....BF....5..8.G 0000A0
86AC42A5 3069C3EB E37D42A0 2074C3F7 DD6D42A3 959BC3FF 040F42A8 0A1CC3FA ....B.....Bm...t..B).....8.. 0000C0
94DF42A7 0A8EC3D7 350642A5 3D58C3E3 5E86429E 6D70C3F7 936242A0 9496C3F1 ....Bb...pm.B.^...[=B.5.....8.. 0000E0
FC724284 53F54431 95C642B0 8B014433 1A8F42B4 B568C3E3 2933429D 83F3C3DC ....B3)...h..B..3D...B..ID.c.B.r. 000120
8D874284 0B51C431 374942A8 96B8C432 9E2C42B1 79D8C430 C94B42B5 891DC42F /....8K.0..y.B..2....B171.Q..B.. 000140
F1F44282 317EC429 D51442B3 7CD0C42A 52A942B3 7B11C42E BA1042B3 0BBEC42D -...B....[.B.R*..l.B..).~..8.. 000160
ED8742AA 50E0C42E 3D1C42B5 5D55C427 EBD542B8 0A49C428 24CE42AF 5902C430 0..V.B.s+I..B..U).B.=...P.B.. 000180
017C0134 018C0134 A35642B2 2350C427 D77B42B4 9ABEC423 F65642AF A9C0C426 &...BV.#...BC..P#.BV.....l. 0001A0
00FC0104 010C0114 011C0124 012C0134 013C0144 014C0154 015C0164 016C0174 t..l.d.\.T.L.D.<.4...s.....l. 0001C0
007C0084 328C0094 009C00A4 00AC00B4 00BC00C4 00CC00D4 00DC00E4 00EC00F4 .....T.L.D.<.4...s.....l. 0001E0
00220094 000C0014 001C0024 002C0034 003C0044 004C0054 005C0064 006C0074 t..l.d.\.T.L.D.<.4...s.....l. 0001F0

```

# APPENDIX II

## PRINTOUT OF ALL INFORMATION

IN FILE C5203

C5203 CALIB. 6 IN SPHERE VP-4 CC 201 PTS QJ PED ABS CAP  
1-12 CC SERIES MIXERS AT END OF ANT CABLES 27-SEP 82 PETE  
ML-201 F= 2001 IN= 10 A-A/B-30 B-10 NO PRESETS AV-4 BU-4

24.355	287.397	21.346	295.728	21.271	300.292	22.384	293.388
21.537	308.184	21.548	301.355	28.417	304.755	21.123	310.243
20.254	304.876	19.463	315.127	28.387	317.538	18.859	319.671
18.906	325.788	19.343	322.553	18.026	327.741	18.117	332.311
18.787	337.387	18.153	341.238	18.254	343.186	18.238	345.181
18.324	348.815	18.382	356.868	18.485	357.851	18.518	362.592
18.765	368.878	19.289	376.737	18.664	368.681	18.827	373.719
20.285	377.588	19.363	379.189	19.874	386.876	21.086	379.936
20.131	389.225	21.087	31.333	21.023	27.968	21.434	38.959
21.422	29.358	20.742	35.853	21.768	39.883	21.366	39.254
22.825	39.788	21.963	48.891	21.922	41.788	21.923	42.165
22.433	45.335	23.829	47.581	22.419	41.139	22.863	45.950
22.572	44.308	22.336	50.855	22.223	52.871	22.523	53.549
22.793	55.345	22.316	54.188	22.553	58.518	22.893	58.549
22.843	56.121	23.394	64.222	22.279	55.888	22.803	57.859
23.594	60.165	23.889	65.349	23.359	63.438	22.198	68.879
22.723	61.798	22.799	66.171	22.328	69.315	22.513	68.879
22.633	63.425	22.263	71.082	21.784	68.478	22.665	62.724
21.195	67.932	21.577	75.082	21.334	76.263	21.991	67.806
21.135	82.797	21.577	78.665	19.852	84.157	19.773	81.394
20.762	89.716	20.463	88.497	19.852	95.295	22.465	92.181
18.573	98.659	19.982	101.618	19.438	95.295	19.131	96.462
18.553	128.592	18.543	123.986	18.773	113.857	18.133	108.745
18.794	128.543	20.829	125.986	19.754	127.485	18.718	122.382
18.592	143.532	20.779	135.676	20.953	130.388	19.191	125.285
20.845	147.346	21.089	146.256	20.552	143.986	20.186	127.859
21.584	159.534	21.688	150.778	22.057	149.518	20.345	146.538
22.363	157.803	21.658	152.189	22.763	157.758	22.513	155.658
22.323	164.979	22.481	157.366	21.016	166.325	22.077	162.445
22.729	167.728	21.975	169.858	22.621	168.268	22.448	162.445
22.513	179.738	22.874	172.852	22.435	175.414	21.992	172.862
21.402	182.143	22.569	177.398	22.623	184.277	22.723	180.593
21.993	183.552	21.893	186.984	22.456	185.519	22.415	181.411
21.993	186.896	21.893	188.988	23.368	192.535	22.555	189.941
21.484	196.557	22.085	192.862	22.334	193.715	21.686	193.327
23.051	201.733	21.778	198.249	21.884	198.588	20.120	199.158
23.112	215.148	20.686	206.883	21.464	212.568	21.899	209.116
20.822	224.314	20.437	224.888	21.773	218.286	21.459	215.346
20.591	231.798	20.535	234.908	21.097	226.438	21.826	219.453
19.645	246.146	20.872	236.286	19.796	232.288	21.038	230.482
					246.388	24.483	242.475
						25.651	249.742

305.782	22.328	309.321	21.123	309.765	18.859	332.311	293.388
329.765	18.777	345.298	18.075	355.282	18.827	373.719	310.243
373.719	19.441	382.945	22.324	386.876	21.086	379.936	332.311
382.945	21.434	386.876	21.366	39.254	21.366	379.936	345.181
386.876	21.923	39.254	21.923	42.165	21.923	42.165	362.592
39.254	22.863	42.165	22.863	45.950	22.863	45.950	373.719
42.165	22.523	45.950	22.523	53.549	22.523	53.549	379.936
45.950	22.893	53.549	22.893	58.549	22.893	58.549	386.876
53.549	22.803	58.549	22.803	68.879	22.803	68.879	39.254
58.549	22.513	68.879	22.513	81.394	22.513	81.394	39.254
68.879	22.665	81.394	22.665	92.181	22.665	92.181	42.165
81.394	21.991	92.181	21.991	96.462	21.991	96.462	45.950
92.181	19.131	96.462	19.131	108.745	19.131	108.745	48.891
96.462	18.718	108.745	18.718	122.382	18.718	122.382	52.871
108.745	18.133	122.382	18.133	125.285	18.133	125.285	58.518
122.382	19.191	125.285	19.191	127.859	19.191	127.859	63.438
125.285	20.186	127.859	20.186	149.829	20.186	149.829	69.315
149.829	20.345	151.635	20.345	151.635	20.345	151.635	76.263
151.635	22.077	156.332	22.077	156.332	22.077	156.332	84.157
156.332	22.448	162.445	22.448	162.445	22.448	162.445	88.497
162.445	22.875	166.325	22.875	166.325	22.875	166.325	95.295
166.325	21.031	172.862	21.031	172.862	21.031	172.862	95.295
172.862	22.282	176.785	22.282	176.785	22.282	176.785	113.857
176.785	22.415	180.593	22.415	180.593	22.415	180.593	127.485
180.593	22.555	189.941	22.555	189.941	22.555	189.941	130.388
189.941	21.686	193.327	21.686	193.327	21.686	193.327	143.986
193.327	20.120	204.347	20.120	204.347	20.120	204.347	149.518
204.347	21.537	211.459	21.537	211.459	21.537	211.459	157.758
211.459	21.826	222.379	21.826	222.379	21.826	222.379	166.325
222.379	21.453	230.482	21.453	230.482	21.453	230.482	168.268
230.482	21.038	236.411	21.038	236.411	21.038	236.411	175.414
236.411	24.483	252.479	24.483	252.479	24.483	252.479	184.277
252.479	25.651		25.651		25.651		185.519

## APPENDIX III

### LISTING OF FORTRAN PROGRAM

PLOT20 FOR Contains subroutine TR which reads NCTR file data,  
and subroutine DCDE which decodes data found in file  
header.





```

C      TYPE *, 'INPUT NO. OF PTS FOR SMOOTHING'
      ACCEPT *, NS
      IF (NS.GT.0) CALL HAMM(A,P,NP,NS)

C      C
C      ELIMINATE BRANCH CUTS IN PHASE DATA
C      C

      CALL LPV(P,185.,30.,PMAX,PMIN,NP)
      TYPE *, 'DO YOU WANT TO PRINT THE DATA ? Y OR N'
      ACCEPT 688,YN
      IF (YN.EQ.'N') GO TO 196
      PRINT 105,LINE1
      PRINT 105,LINE2
      PRINT 105,PARAM
      PRINT 689,(A(JP),P(JP),JP=1,NP)

C      C
C      PLOT A DATA FILE
C      C
196     CALL EPLLOT(A,P,INFILE,PMAX,PMIN,AMAX,AMIN,FINC,FMAX,FMIN,NP,NS)
198     CONTINUE
      CALL PLOT(0,0,999)
      CALL EXIT
      END
      SUBROUTINE TR(INFILE)
      INTEGER*2 INFILE(15),IBUFF(3320)
      COMMON BUFF
      BYTE BUFF(6656),TBUFF(512)
      EQUIVALENCE (BUFF(1),IBUFF(1))
      WRITE(6,5)
      FORMAT(1X,'TYPE DATA FILE NAME')
      ACCEPT 10,INFILE
10      FORMAT(15A2)
      INFILE(15)=0
      IB=1
      ICNT=0
      OPEN(UNIT=8,NAME=INFILE,TYPE='OLD')

C      C
C      SET BLOCK LENGTH IN BYTES
C      C
82      IF (IB.EQ.1) LEN=512-9*4
      IF (IB.GT.1) LEN=512-26*4

C      C
C      READ A BLOCK OF 512 BYTES
C      C
88      READ(8,80,END=90)(TBUFF(I),I=1,512)
      FORMAT(512A1)

C      C
C      STORE A BLOCK INTO THE BUFFER ACCORDING TO ITS LENGTH
C      C
      DO 85 I=1,LEN
      BUFF(ICNT+1)=TBUFF(I)
      IB=IB+1
      ICNT=ICNT+LEN
      GO TO 82
90      DO 86 I=1,LEN
86      BUFF(ICNT+1)=TBUFF(I)

C      C
C      ELIMINATE BLANK SPACES IN BETWEEN EACH CHARACTER
C      IN A FILE HEADER
C      C
      DO 40 I=1,180
40      BUFF(I)=BUFF(2*I-1)
331     CLOSE(UNIT=8,DISP='SAVE')

```

```

RETURN
END
SUBROUTINE DCDE(NP,FMIN,FINC)
COMMON BUFF
BYTE BUFF(6656)
INTEGER*4 IMIN,IINC,NP

C
C
C
NO OF DATA POINTS IS STORED IN THREE CHARACTERS, AND
STARTING FREQ AND FREQ INC. IN 5 CHARACTERS

CHARACTER*3 CNL
CHARACTER*5 CFF,CINC
EQUIVALENCE (BUFF(124),CNL),(BUFF(131),CFF),(BUFF(140),CINC)

C
C
C
CONVERT CHARACTERS INTO THEIR NUMERICAL EQUIVALENTS

100 DECODE(3,100,CNL)NP
    FORMAT(15)
    DECODE(5,100,CFF)IMIN
    DECODE(5,100,CINC)IINC
    FMIN=FLOAT(IMIN)/1000.
    FINC=FLOAT(IINC)/1000.
    TYPE 200,NP,FMIN,FINC
200  FORMAT(' NP=',18,' FMIN=',F10.4,' FINC=',F10.4)
    RETURN
    END

SUBROUTINE AVMM(A,AVM,NP)
REAL A(801)
AVM=0.
DO 10 I=1,NP
10  AVM=AVM+A(I)
AVM=AVM/NP
RETURN
END

```

```

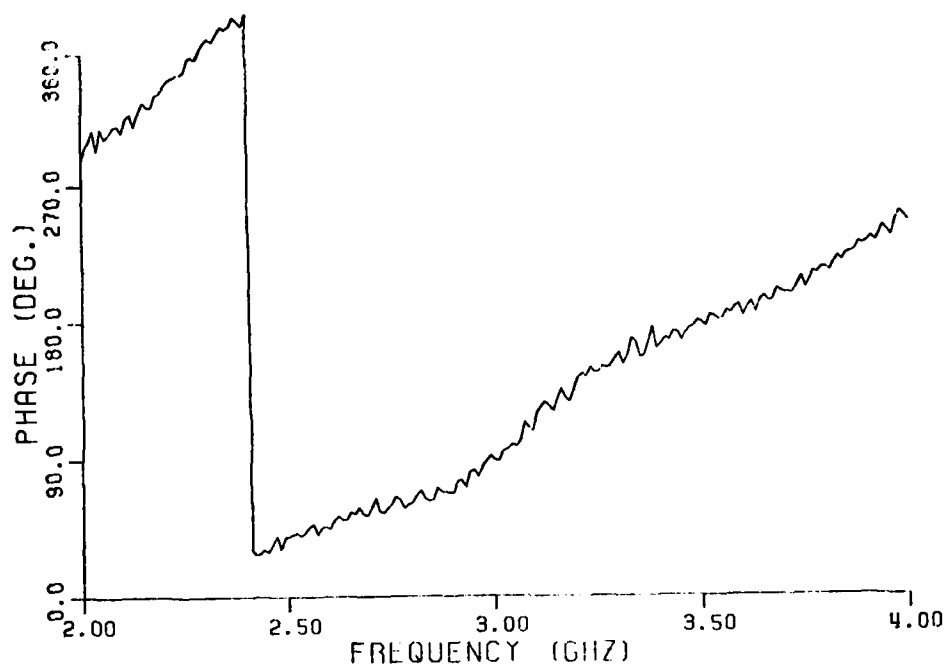
SUBROUTINE LPV(P,VR,DV,PMAX,PMIN,NP)
REAL*4 P(801)
DO 100 I=1,NP
100 IF(P(I).GT.PMAX)P(I)=P(I)-360.
IF(P(I).LT.PMIN)P(I)=P(I)+360.
PMED=(PMAX+PMIN)/2.
DO 10 I=1,NP-1
IF(ABS(P(I+1)-P(I)).LT.VR)GO TO 10
IF(P(I).LT.PMED)P(I+1)=P(I+1)-360.
IF(P(I).GT.PMED)P(I+1)=P(I+1)+360.
IF(P(I+1).GT.PMAX+DV)P(I+1)=P(I+1)-360.
IF(P(I+1).LT.PMIN-DV)P(I+1)=P(I+1)+360.
10 CONTINUE
RETURN
END
SUBROUTINE HAMM(A,PH,K,N)
DIMENSION A(801), PH(801), AA(801),PPH(801)
DTR=57.29577958
TPI=6.2831853
DO 4 KL=1,K
4 A(KL)= 10.0**(A(KL)/20.)
N2=(N-1)/2
DO 3 KM=1,K
REAL=0.0
XIMAG=0.0
KOUNT=1
2 KW=KM-N2+KOUNT-1
OFF=FLOAT(KM-KW)*TPI/FLOAT(N)
IF(KW.LT.1) KW=2-KW
IF(KW.GT.K) KW=2 * K - KW
W=COS(OFF)+1.
FACT=W*A(KW)
REAL=REAL+FACT*COS(PH(KW)/DTR)
XIMAG=XIMAG+FACT*SIN(PH(KW)/DTR)
IF KOUNT.EQ.N GO TO 1
KOUNT=KOUNT+1
GO TO 2
1 CONTINUE
REAL=REAL/FLOAT(N)
XIMAG=XIMAG/FLOAT(N)
AA(KM)=SQRT(REAL*REAL+XIMAG*XIMAG)
PPH(KM)=ATAN2(XIMAG,REAL)*DTR
3 CONTINUE
DO 5 KKK=1,K
A(KKK)=20.0 * ALOG10(AA(KKK))
PPH(KKK)=PPH(KKK)
5 CONTINUE
RETURN
END
SUBROUTINE EPLT(A,P,INFILE,
1 PMAX,PMIN,AMAX,AMIN,FINC,FMAX,FMIN,NP,NS)
INTEGER*2 INFILE(15),LINE1(30),LINE2(30),PARAM(30)
DIMENSION F(801),A(801),P(801)
COMMON BUFF
BYTE BUFF(6656)
EQUIVALENCE(LINE1(1),BUFF(1)),(LINE2(1),BUFF(61))
PARAM(1),BUFF(121))
7 K=1,NP
7 F(K)=FMIN+(K-1)*FINC
6 CONTINUE
NCA=23
NCP=12

```

```

NCF=15
DSF=(FMAX-FMIN)/6.0
DSA=(AMAX-AMIN)/4.0
DSP=(FMAX-PMIN)/4.0
CALL PLOT(1.,1.,-3)
CALL AXIS(0.,0.,'FREQUENCY (GHZ)',-NCF,6.,0.,FMIN,DSF,1.5,2)
CALL AXIS(0.,0.,'10*LOG(SIGMA) (SQ. CM.)',NCA,4.,90.,AMIN,DSA,1.,1)
CALL LINE(F,FMIN,DSF,A,AMIN,DSA,NP,0,1)
CALL PLOT(0.,5.,-3)
CALL AXIS(0.,0.,'FREQUENCY (GHZ)',-NCF,6.,0.,FMIN,DSF,1.5,2)
CALL AXIS(0.,0.,'PHASE (DEG.)',NCP,4.,90.,PMIN,DSP,1.,1)
CALL LINE(F,FMIN,DSF,P,PMIN,DSP,NP,0,1)
CALL SYMBOL(.2, -.8, .1, LINE1, 0.,0,60)
CALL SYMBOL(.2, -1., .1, LINE2, 0.,0,60)
CALL SYMBOL(.2,-1.2,.1,PARAM,0.,60)
CALL SYMBOL(.2,-1.4,.1,INFILE,0.,12)
N1=NS
CALL SYMBOL(2.,-1.4,.1,'PT OF SMOOTHING',0.,15)
CALL NUMBER(4.,-1.4,.1,RN,0.,-1)
CALL PLOT(0.,0.,-999)
RETURN
END

```



C5203 CALIB. 6 IN SPHERE VP-4 GC 201 PTS 0J PFD ASS CAP  
 1-12 GC SERIES MIXERS AT END OF ANT CABLES 27-SEP 82 PETE  
 NL=201 FF= 2001 IN= 10 A=A/B\*30 B=10 NO PRESEIS AV=4 BW=4  
 C5203. PT OF SMOOTHING 0

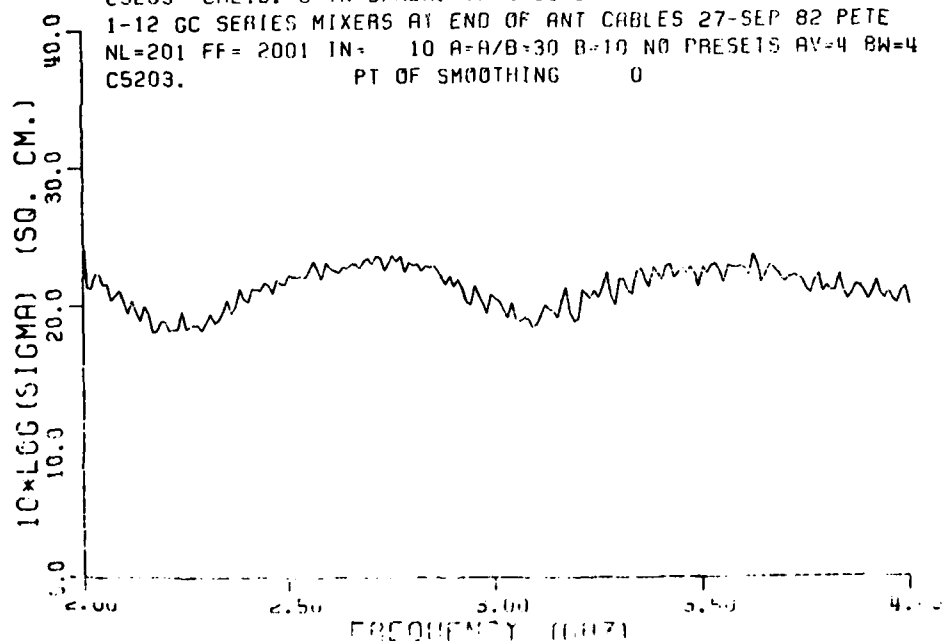


Figure A III-1. Plot of file C5203 (output of PLOT 20.FOR).